reducing barometric readings to the standard value of gravity adopted by the International Bureau of Weights and Measures, supplementing a table that has been introduced for directly reducing barometer readings from the value of gravity at the place of observation to its standard value.

The new values of vapor pressure and of gravity acceleration thus obtained, together with a recent and more accurate determination of the density of mercury, have called for an extensive revision of numerous other tables, and especially of those for the reduction of psychrometric observations, and the barometrical tables.

Among the new tables added are those for converting barometric inches and barometric millimeters into millibars, for determining heights from pressures expressed in dynamic units, tables of gradient winds, and tables giving the duration of astronomical and civil twilight, and the transmission percentages of radiation through moist air.

The tables of International Meteorological Symbols, of Cloud Classification, of the Beaufort Scale of Winds, of the Beaufort Weather Notation, and the List of Meteorological Stations, are among those extensively revised.

Tables for reducing barometric readings to sea level, and tables of logarithms of numbers, of natural sines and cosines, of tangents and cotangents, and for dividing by 28, 29, and 31, with a few others have been omitted from this edition.

BEN NEVIS OBSERVATORY REOPENED.

[Reprinted from Aeronautics (London), July, 1919, p. 43.]

The Air Ministry, states the Observer, is about to take over the observatory erected on the summit of Ben Nevis 35 years ago by the Scottish Meteorological Society, and utilize it in connection with their system of weather forecasting for aerial purposes. This will be an important addition to the chain of meteorological stations already established, as by its means continuous observations of the physics of the upper air will be possible at an elevation of well over 4,000 feet above sea level.

For 20 years the Scottish Meteorological Society maintained the Ben Nevis Observatory, and daily records were obtained for comparison with the sea-level records at Fort William Observatory at the foot of the mountain. But its upkeep was a heavy drain on the society's resources, necessitating an expenditure of £1,000 a year, toward which the Government contributed only £100, as a grant from the meteorological committee. About the year 1900 the society intimated that it would be compelled to close the observatory; but, fortunately, Mr. Mackay Bernard, of Dunsinnon, came forward and promised £500 annually for four years. The society therefore decided to continue the observatory in the hope that the Government would follow the lead of continental nations—German especially—and make itself responsible for this high-level meteorological observatory.

But instead of additional Government assistance, in 1904 the grant from the meteorological committee was withdrawn, and the Scottish Meteorological Society, unable to guarantee the cost of the institution, in that year, withdrew the staff, and the observatory closed. Since then the buildings have fallen into a sad state of repair, and last year a party who ascended Ben Nevis reported that the observatory was falling to pieces.

Now that the Air Ministry has taken over the observatory it will probably be entirely rebuilt and equipped with modern instruments. Meteorologists know very little about the upper air, especially the prevailing winds and currents, and their relation to the surface winds. These are some of the things that must be scientifically investigated before aviation will be as safe and reliable as ocean traveling, and if observatories similar to that on Ben Nevis were established by the Air Ministry on all the elevated peaks of the British Isles it would hasten forward the solution of the problems of the upper air, for which we now mainly rely on the automatic records brought to earth by ballons-sondes.

MOUNTAIN METEOROLOGICAL STATIONS IN EUROPE.

[Reprinted from Scientific American, New York, Aug. 16, 1919, p. 153.]

Mountain meteorological stations in Europe, as they were before the war, are described in a recent number of Naturwissenschaften by Prof. F. Klengel. Of the 21,500 stations in operation in various European countries, 660 were more than 1,000 meters above sea level, about 150 more than 1,500 meters, 44 more than 2,000 meters, 8 more than 2,500 meters, and 1, the Sonnblick Observatory, above 3,000 meters. The observatory of the Sonnblick (3,106 meters) is the highest meteorological station in Europe that is in operation the year round, but there are still higher stations that remain open a few months each year; e. g., the Vallot Observatory on Mont Blanc (4,358 meters) and the Regina Margherita Observatory on Monte Rosa (4,560 meters). These very lofty establishments are inaccessible in winter, but are used for various investigations in summer. The above enumeration of lofty stations does not include a large number of seasonal snow gages, or so-called "totalizers," which have been installed on an extensive scale in the Alps by the Swiss Meteorological Service. These gages are visited once a year, when the gage is emptied and its contents measured.

THE HARVARD STATION IN JAMAICA.

By WILLIAM H. PICKERING.

[Review. Annals of the Harvard College Observatory, vol. 82, No. 1, pp. 37.]

In consideration of the condition upon which property, to the value of $230,000, was left to the Harvard College Observatory by the will of the late Uriah A. Boyden, for the purpose of furthering astronomical research "at such elevation as to be free, as far as practicable, from the impediments to accurate observations which occur in the observatories now existing, owing to atmospheric influences," three expeditions were sent to Jamaica.[1] It was decided to locate the observatory at Mandeville (elevation, 2,100 feet), as the place most satisfactorily fulfilling the conditions of the bequest; yet for the value of astronomers and other interested parties, a series of meteorological observations, such as were pertinent to the astronomical work, were carried out. Thus certain observations, usually made at meteorological stations were omitted, while others, which are quite unsual were made.

Temperature.—In the thermometric observations the equipment consisted of standard maximum and minimum thermometers and a Richard thermograph. These were not exposed in a shelter, but upon the porch of a house facing the east. The only ill effect, from a thermometric standpoint, was due to the sun shining upon

[1] Cf. "The meteorological activities of the late Prof. Edward C. Pickering," by R. De C. Ward, MONTHLY WEATHER REVIEW, April, 1919, 47: 241-242.

the thermograph in the early hours; but this was not serious because the temperature at that time was, for the purpose, not used, and the consequent "cusp" in the curve afforded a record of the clearness of the sunrise.

The temperatures as observed at Mandeville are quite interesting. The highest temperature recorded during four years 1912–1916 was 89.2° F. The lowest recorded temperature was 56.1° F. On four days only did the thermometer fail to reach 70° F. The warmest night, August 12, 1915, the thermometer did not fall below 74.6° F. The mean daily variation from the normal for four years is 12.4°.

When the thermometer goes above 85° it is considered hot, and when it drops below 60° it is considered cold.

Wind.—Wind observations were not made automatically as no anemometer or wind recording apparatus was carried. General observations showed, however, that the prevailing wind comes from the ESE. While hurricanes occasionally pass near the station, the most severe was the one of November, 1912, when the maximum wind velocity was estimated at 55 miles per hour. It was believed that owing to the broken and hilly nature of the country about Mandeville, this figure is probably correct.

Rainfall.—Rainfall is very heavy. The mean of 28 years is 87.84 inches. The minima of the rainfall seem to occur in February and July. It always rains hard, and most generally comes in sharp, short showers. So sharp is the edge of a shower that it has rained on one side of the house and not at all on the other. On the average it rains 182 days each year. The heaviest rainfall recorded for 24 hours was 9.90 inches. Attention is called to the fact that the rainfall minima for the island seem to have a certain relation to the sunspot period. It was concluded that there was a diminishing of rainfall about 1.3 years after every sunspot maximum and minimum, although no attempt is made to trace the relation definitely.

Dew.—Dew is quite important in astronomical work and it was found to be so heavy that a desirable means of measuring it was sought. It was measured by the following device, consisting "of a square blackened funnel measuring 60 cm. on a side and 10 cm. in depth. It is supported in a wooden box at a height of 50 cm. above the ground, and is so arranged that fresh air can reach the under side of the funnel, which is also blackened. A bottle collects the precipitated moisture. While some of this is retained on the funnel, experiment shows that this is in a large part compensated by some which is precipitated on the under side of it." The maximum dewfall recorded was one standard gallon per hundred square feet of surface.

Clearness.—The clearness of the sky and the quality of the "seeing" are, of course, of paramount importance to the astronomer. Observations were made on sunshine and starlight as well as upon the clearness of the atmosphere, and it was found that the number of clear days and nights is unusually large. Also the sky seemed much clearer than in temperate zones. "The sky appears darker, possibly owing to the complete absence of any more or less permanent auroral illumination. The most noticeable effects are in the whiteness of the Moon as distinguished from its yellow color in the north, the brilliancy of the Milky Way, the distinctness of the Zodiacal Band at midnight and of the Gegenschein, which sometimes appears as early as 9 o'clock, and the brilliancy of comets' tails." In general, it is believed that good "seeing" does not associate itself with dry air, but the very contrary, for the best "seeing" at Mandeville seemed to come on very wet nights. This tends to disprove the contention that observatories should be built in deserts. The only advantage of such a location over that in Jamaica is that there might be a greater percentage of clear nights, although that is not necessarily true.—*C. L. M.*

THE RELATION BETWEEN WIND AND THE DISTRIBUTION OF PRESSURE.[1]

By H. JEFFREYS.

[Abstract reprinted from Nature (London), July 17, 1919, p. 398.]

A classification of some 600 wind observations over the North Sea, according to their velocities and directions, showed that the most striking feature of the resulting values was their asymmetrical frequency distribution. From the fact that this was noticeable in nearly every class, it was inferred that it could be produced only by variation in turbulence or systematic contortion of the isobars, on a scale too small to be recorded on the weather map. The latter cause, however, and also such variations in turbulence as keep the coefficient of eddy viscosity the same at all heights, would lead to strong correlations between S/G and α, which are not observed. Hence it is concluded that the principal cause of variation in the relation of the surface wind to the gradient is variation in the vertical distribution of turbulence; and it is shown that such variation could give the effects actually observed.

MOTION OF THE AIR IN LOWEST LAYERS OF THE ATMOSPHERE.[2]

By G. HELLMANN.

[Abstract reprinted from Science Abstracts, July, 1919, p. 311.]

The ground wind is investigated by measurements of wind velocity at five different heights between 5 and 200 cm. above unobstructed ground near Berlin, and it is found that in this lowest layer the mean wind velocities are proportional to the fourth roots of the corresponding heights.

The previous work of the author for heights varying from 200 cm. (2 m.) to 258 m. above the ground gave rise to a similar result, in which, however, the velocities were proportional to the fifth roots of the corresponding heights.—R. C.[3]

LOCAL WIND VARIATIONS.

[Reprinted from Meteorological Office Circular, Mar. 26, 1918, pp. 2-3.]

There is a natural tendency to assume that a single anemometer gives a fair representation of the wind over a large area. A study of the records from the two anemometric stations at Southport shows that the assumption is by no means always justified. At Hesketh Park, the climatological station to which all Southport observations, except those of wind, refer, the anemometer vane is 50 feet above ground, 20 feet above the tallest trees in the park, and 30 feet above those nearest it. The records of wind strength, given by an anemobiagraph, and of direction, given by a Baxendell anemoscope, show considerable gustiness under all conditions. At the Marshside wind station, about a mile

[1] Royal Society, London, June 26, 1919.
[2] Preuss. Akad. Wiss. Berlin, Ber. 22. pp. 404–416, 1919.
[3] Cf. Prof. notes No. 6, p. 572, above.